MAKERERE UNIVERSITY
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DEPARTMENT OF INTERNAL MEDICINE

IMPROVING ESTIMATION OF PREVALENCE OF HEPATIC ENCEPHALOPATHY AMONG LIVER DISEASE PATIENTS ON THE GASTROENTEROLOGY WARD AT MULAGO HOSPITAL

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DECLARATION

I Nalumansi Anna Maria, hereby declare that the work presented in this dissertation has not been presented for any other degree in any University.

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DEDICATION

This book is dedicated to my parents Mr. and Mrs. Ssenoga, my brother Eng. Kigozi Joseph, my husband Dr. Kimera Andrew and my son Carter Paul. Thank you for supporting me through this journey.
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OPERATIONAL DEFINITIONS

In this study the following operational definitions were used:

1. **Liver disease**
   This was defined as documentation of any of the following diagnoses on the final diagnosis field of the face sheet:
   a) Alcoholic liver disease
   b) Toxic liver disease
   c) Acute liver failure
   d) Acute hepatitis
   e) Chronic hepatitis
   f) Liver peri-portal fibrosis
   g) Cirrhosis of the liver
   h) Other inflammatory liver diseases for example liver abscess, autoimmune hepatitis, phlebitis of the portal vein
   i) Other diseases of the liver for example: fatty change of the liver, infarction of the liver, portal hypertension, hepatic veno-occlusive disease, liver cysts.

2. **Presence of Hepatic encephalopathy**
   This was defined as documentation of the diagnosis of HE on the final diagnosis field of the face sheet.

3. **Type of hepatic encephalopathy**
   This was defined as the type of HE documented on the final diagnosis field on the face sheet as follows:
   a) Type A (Acute): Acute and hyper-acute liver failure
   b) Type B (Bypass): Portosystemic bypass without intrinsic hepatocellular disease
   c) Type C (Cirrhosis): Cirrhosis and portal hypertension with portosystemic shunts

4. **Grade of hepatic encephalopathy**
   This was defined as the first recording of grade of HE on the patient’s monitoring chart which is also used to monitor vital signs and symptoms.
   The grading was as follows:
   Grade using West Haven criteria
0: No abnormality apparent on clinical examination
1: Short-term memory loss, difficulty in concentrating and reverse of sleep-wake cycle
2: Lethargy, apathy, drowsiness, flapping tremor, disorientation, confusion, inappropriate behavior
3: Stupor but easily arousal, marked confusion, incoherent speech
4: Coma, unresponsive

5. ** Appropriately completed medical records:**
   These were defined as follows:
   - Adequately completed face sheet:
     All the fields on the face sheet are completed. Not applicable (N/A) was filled for fields where the information did not apply to the patient. Unknown was filled where the required information was not known by the patient or attendant
   - Adequately documented final diagnosis for HE:
     The diagnosis of HE and its type were filled in the final diagnosis field of the face sheet where this was applicable.
   - Adequately completed monitoring chart:
     The grade of HE was recorded on the Temperature monitoring chart where this was applicable.

6. **Health care team:**
   The health care team included the following: Junior house officers (intern doctors), Senior House Officers (postgraduate students), Physicians, and Nursing officers.

7. **Improved estimate of prevalence of hepatic encephalopathy:** refers to the prevalence of HE obtained in the presence quality improvement methods in the process of data collection.
ABBREVIATIONS

FGD: Focused Group Discussions

FMEA: Failure Mode and Effects Analysis

GI ward: Gastro-intestinal ward

HE: Hepatic Encephalopathy

HMIS: Health Management Information Systems

IP: In Patient

KII: Key Informant Interview

MO: Medical Officer

MOH: Ministry Of Health

OHE: Overt Hepatic Encephalopathy

PDSA: Plan Do Study Act

QI: Quality Improvement

QIT: Quality Improvement Team

RCA: Root Cause Analysis

Reg No.: Registration Number

SHO: Senior House Officer

WHO: World Health Organization
ABSTRACT

Background: Liver disease is a major cause of morbidity and death worldwide. Hepatic encephalopathy is a common complication of liver disease. It has significant impact on a patient's quality of life and recently has been associated with increased hospitalizations and death. Doctors on the GI ward would like to improve management of patients with HE. To do this, they need to know the current burden of the disease on the ward. Unfortunately, there is no current data on the prevalence of HE on the GI ward. The data from patient medical records can provide information on prevalence of HE on the GI ward, however, these medical records aren’t adequately completed. If used in the current state, the estimate obtained will be inaccurate.

Objective of the study: To obtain an improved estimate of the prevalence of HE among patients with liver disease admitted on the GI ward at Mulago Hospital.

Methods: The study was a cross-sectional study with quality improvement components in the process of data collection. It was carried out on the GI ward at Mulago hospital. The QI methods used included: process mapping, root cause analysis, QI intervention and Plan Do Study Act cycles to improve the completion of the face sheets and monitoring charts where we collected our data so as to obtain an improved estimate from these records. 265 patient medical files with documented liver disease diagnosis on the face sheet were sampled by consecutive sampling after the patients had been discharged from the GI ward. A data extraction tool was completed. This data was summarized weekly and plotted on run charts.

Results: Root causes of inadequate documentation of HE diagnosis and other fields on the face sheets were multi factorial and included health worker related, environmental, system related and equipment related factors. With the education, the knowledge of the QIT on completion of the face sheets and monitoring charts improved to some significant extent but needs to be regularly reinforced to be maintained. With continuous reminders and close supervision, the completion of the face sheets improved. From these face sheets; the prevalence of HE among liver disease patients was 22.3%. The most common type of HE was type C.

Conclusions: The main cause of inadequate completion of the face sheets and monitoring charts is lack of supervision of the health care team by the physicians on the GI ward. With the education intervention, the knowledge of the QIT and completion of the face sheets improves but needs to be regularly reinforced. The prevalence of HE among liver disease patients was 22.3%. 
**Recommendations:** Close supervision and continuous reminders of the health care team by the physicians on the GI ward is recommended to maintain adequate completion of the face sheets and monitoring charts. The various ward units and hospital at large should have regular meetings to utilize the data on prevalence from weekly run charts. We recommend the pharmacy stock medicines for HE for at least 5 patients every week.
CHAPTER ONE: BACKGROUND

1.1 INTRODUCTION

Medical records as sources of data

There are 3 sources of evidence that inform clinical decisions and actions: medical literature, the patient and medical records. To be useful, the medical records should be complete and contain all the significant information that members of the healthcare team, or future careers, will need in order to be sufficiently informed about the patient’s past and current clinical assessments and treatment and relevant family and social history, lifestyle and beliefs (Anthony, 2014). Poor presentation of patients’ data can lead to poorly informed clinical practice, medication errors, inappropriate repeat investigation, unnecessary referrals and wastes clinical time and other resources (Else Nygren, 1998). The data from patient encounters with health workers can be aggregated to provide information for communities, regions and countries, upon which public health policy is shaped. This includes resource management, monitoring and evaluation and disease surveillance (WHO, 2012).

Few studies have been done on completion of medical records in Uganda. A study carried out at an ART clinic at Mpumudde Health center IV in Jinja municipality revealed that only 27% of the patient’s’ records between April and September 2011 were found complete (Kayizzi, 2012).

Liver disease

Liver disease is a major cause of morbidity and death worldwide (Wang, Fan, Zhang, Gao, & Wang, 2014). New Global Burden of Disease estimates suggest that cirrhosis caused over a million deaths in 2010, with a further million due to liver cancer and acute hepatitis (Byass, 2014). Chronic liver disease mortality in Africa doubled between 1980 and 2010, from 53,000 to 103,000 deaths per year, and is still on the rise. Causes included hepatitis B (34%), hepatitis C (17%), alcohol (18%) and unknown causes in 31%. Hepatitis B, C and alcohol accounted for 47, 23 and 20% of hepatocellular carcinoma causes respectively. In 10%, the underlying etiology
was not known (Spearman, 2015). Prevalence of decompensated liver cirrhosis accounted for about 17.6% of patients admitted on the GI ward at Mulago hospital (Apica, 2013).

**Hepatic encephalopathy (HE)**

This is a common complication of liver disease significantly affecting the lives of patients and their caregivers (Vilstrup et al., 2014). Hepatic encephalopathy has a significant impact on a patient's quality of life, driving performance, and recently has been associated with increased hospitalizations and death (Fichet et al., 2009; Patidar & Bajaj, 2015). It negatively impacts on patient survival and is associated with short survival (Bustamante et al., 1999). A study done at Mulago hospital showed that 23.5% of patients with decompensated liver cirrhosis developed hepatic encephalopathy (Apica, 2013). This study, however, focused on patients with liver cirrhosis which is type C hepatic encephalopathy and not the other types.

The data from patient medical records can provide information on prevalence of HE on the GI ward. Estimation of the prevalence from our records involves a process of documentation over a period of time. If the process is not improved, the estimate from these records may be inaccurate e.g. incomplete medical records may underestimate or overestimate the prevalence of HE, there may be shortage of face sheets or there may be no doctors to fill the face sheets. In order to obtain an improved estimate of the prevalence of HE from medical records, there is need to improve the process of documentation on the face sheet and monitoring chart using QI methods so that the estimate is more accurate and nearer the true estimate. There is also need to document the process during the estimation of prevalence so that there is better judgment on how close the estimate is to the truth.

**1.2 RESEARCH PROBLEM**

Liver disease is a major cause of morbidity and death worldwide (Wang et al., 2014). Prevalence of decompensated liver cirrhosis accounted for about 17.6% of patients admitted on the GI ward at Mulago hospital (Apica, 2013). HE is a common complication of liver disease significantly affecting the lives of patients and their caregivers (Vilstrup et al., 2014). Doctors on the GI ward would like to improve the management of the patients with HE for example, start prescribing newer more effective medicines like rifaximin, which should be freely available at the hospital.
pharmacy since most of these patients depend on the drugs supplied by the government. In order to do this the pharmacy needs to know the burden of HE on the ward so that appropriate recommendations can be made regarding the quantities of medicines to be procured. Unfortunately, there is no current data on the burden of HE among liver disease patients on the GI ward. This prevalence can be extracted from the medical records. Unfortunately, medical records on the GI ward and other areas of Uganda (Kayizzi, 2012) are often not well completed. If the medical records are used without quality improvement to estimate the burden of HE, it is likely to result in a wrong estimate. In order to obtain an improved estimate of the prevalence of HE, it is necessary to improve the process of documentation using recognized QI methods

1.3 JUSTIFICATION

Data from this study is expected to result in better health planning for the management of patients with hepatic encephalopathy. For example, newer and better drugs like rifaximin are now used worldwide to treat HE and we need to know how much to procure for our patients. This study will provide current information to be used estimating medicines requirements for treating HE. If this study is not done resources may be wasted in case large quantities of medicines are procured when the true prevalence of HE is low. On the other hand, if the true prevalence of HE is high and only small quantities of medicines are procured, some patients whose lives may have been prolonged may not get the required medicines and they may die.

1.4 RESEARCH QUESTIONS

1. What is the prevalence of HE among patients with liver disease on the GI ward?
2. What is the frequency of the various grades and types of hepatic encephalopathy?
3. What are the roots causes of inadequate documentation of HE diagnosis on the face sheets and monitoring charts on the GI ward?
4. What is the trend in the level of knowledge of the health care team regarding documentation of the diagnosis of HE on the face sheets and monitoring charts before and during an in-service education intervention designed to improve knowledge on these issues?
5. What is the trend in the proportion of the face sheets and monitoring charts that are adequately completed for HE before and during an in-service education intervention of the GI ward health care team to improve the practice of completion of these medical records?

1.5 GENERAL OBJECTIVE

To contribute to improving the care of patients with liver disease on the GI ward by generating data to be utilized in planning.

1.6 PRIMARY OBJECTIVE

1. To obtain an improved estimate of the prevalence of HE among patients with liver diseases admitted on the GI ward at Mulago Hospital.
2. To obtain the frequency of the various grades and types of HE.

1.7 SECONDARY OBJECTIVES

1) To determine the root causes of inadequate documentation of HE diagnosis on the face sheets and HE grade on the monitoring charts on the GI ward.
2) To document the trend in the level of knowledge and attitudes of the health care team regarding documentation of HE diagnosis on the face sheets and HE grade on the monitoring charts before and during an in-service education intervention.
3) To determine the trend in the proportion of the face sheets and monitoring charts which are adequately completed for HE before and during an in-service education intervention.

1.8 CONCEPTUAL FRAME WORK

To obtain an improved estimate of prevalence of HE, there is need to have an improved process of documentation of the diagnosis of HE on the face sheets. An improved process of documentation depends on the following factors: health worker knowledge and attitude, time to fill the face sheets, availability of the face sheets and monitoring chart as well as incorporation of QI methods in the process. These factors are summarized in figure 1.
Health worker knowledge and attitudes

Time to complete the medical records

Availability of the face sheets and monitoring charts

Use of QI methods
- Process mapping
- Root cause analysis
- QI intervention
- PDSA
- FMEA

Improved process of documentation of HE diagnosis on the face sheets and grade on the monitoring charts

Improved estimate of HE prevalence

Documentation of the process
- Run charts
- PDSA

Figure 1: Conceptual frame work
CHAPTER TWO: LITERATURE REVIEW

2.1 MEDICAL RECORDS

A health record is any relevant record made by a health care practitioner at the time of or subsequent to a consultation or examination (Africa, 2008). Good medical records facilitate good care and patient safety, promote continuity of care across time and care settings, ensures legal security of the operator and the patient (Marinič, 2015). In Africa, the use of paper records is still dominant in the public hospitals (Luthuli, 2017). Medical records should therefore be legible, complete, specific, contemporaneous, signed and dated (Ombudsman, 2015). Auditing anesthetic records in a hospital in KwaZulu-Natal South Africa, found that less than one-third of all records were complete or legible (Chamisa & Zulu, 2007). All health care personnel who document or manage health care records must be provided with appropriate orientation and ongoing education on the documentation and management of health care records (NSW 2012). The study done in a Dalefage Primary Hospital, West Afar, Ethiopia, showed that an enhancement of completeness and reporting of in-patient medical record completeness improved significantly from the baseline 0% to 73.6% during post-intervention evaluation (Kasu, 2017). In Menelik II Referral Hospital, Ethiopia, baseline assessments were collected and inpatient medical record completeness showed 73% which is low against the standard in which medical record completeness is expected to be 100%. Knowledge gap and shortage of medical record format were accepted as root cause for existence of incomplete inpatient medical records (Tola, Abebe, Gebremariam, & Jikamo, 2017).
2.2 QUALITY IMPROVEMENT METHODS

Quality is the degree of excellence in healthcare. QI is a systematic approach that uses specific techniques to improve quality. Improving quality is about making healthcare safe, effective, patient-centered, timely, efficient and equitable (Foundation, Second edition, August 2013.).

QI methods include the following:

1. Process mapping

This is a tool used to chart each step of a process. It is commonly used to map the pathway through a patient’s health care journey. It is useful as a tool to engage staff in understanding how the different steps fit together, which steps adds value to the process and where there may be waste/delays and QI opportunities. The figure 2 below shows the process map constructed in a study to improve inpatient medication adherence using attendant education in a tertiary care hospital in Uganda (Alupo, 2017).

![Process Mapping of Inpatient Medication Administration at Mulago Hospital](image)

Figure 2: An example of a process map

2. Root cause analysis(RCA)

Root cause analysis is a structured process used to identify causes after clinical audit findings demonstrate short falls in the quality of care so that resources for quality improvement can be
appropriately directed towards the true cause of the problem. A tool often used in RCA is the fishbone cause and effect diagram. With each line of enquiry identified it is helpful to ask ‘Why does this happen?’ five times, known as ‘The Five Whys Technique’, to explore causes and remedial actions (Partnership, 2015). The figure 3 illustrates the 5 whys method of RCA(Bodnar, 2018).

![Figure 3: Root Cause Analysis](Image from www.trainerbubble.com)

3. PDSA cycles

This is an approach to continuous quality improvement where changes are tested in small cycles. It requires one to introduce and test potential quality improvements and refine them on a small scale, prior to wholesale implementation. Making changes to processes can give unexpected results, so it is safer and more efficient to test quality improvements on a small scale before wholesale implementation (Partnership, 2015). The purpose of the PDSA method lies in learning as quickly as possible whether an intervention works in a particular setting and
to making adjustments accordingly. PDSA is easy, flexible, and can be applied in practice by anyone (Julie E Reed, 2016).

Stages of PDSA:
1) Investigation and problem framing: Define the problem, causes and contributing factors.
2) Plan: Design an intervention and data collection plan
3) Do: Implement the plan
4) Study: Analyze data and compare results to the definition of success.
5) Act: Act on the results

(Julie E Reed, 2016).

These cycles are linked with three key questions:

1. What are we trying to accomplish?
2. How will we know that a change is an improvement?
3. What changes can we make that will result in improvement?

Each cycle starts with hunches, theories and ideas and then evolves into knowledge that can inform action and, ultimately, produce positive outcomes. This is the recommended approach by Ministry of Health (Uganda, 2016). The figure 4 illustrates the PDSA cycles (Lloyd, 2018).

Finally, remember that data are a necessary part of the Sequence of Improvement

Figure 4: PDSA cycles
4. Failure Modes and Effects Analysis

Failure Modes and Effects Analysis (FMEA) is a tool for conducting a systematic, proactive analysis of a process in which harm may occur. In an FMEA, a team representing all areas of the process under review convenes to predict and record where, how, and to what extent the system might fail. Then, team members with appropriate expertise work together to devise improvements to prevent those failures — especially failures that are likely to occur or would cause severe harm to patients or staff. The FMEA tool prompts teams to review, evaluate, and record the following: Steps in the process

- Failure modes (What could go wrong?)
- Failure causes (Why would the failure happen?)
- Failure effects (What would be the consequences of each failure?)

Teams use FMEA to evaluate processes for possible failures and to prevent them by correcting the processes proactively rather than reacting to adverse events after failures have occurred. This emphasis on prevention may reduce risk of harm to both patients and staff. FMEA is particularly useful in evaluating a new process prior to implementation and in assessing the impact of a proposed change to an existing process (IHI, 2017).

5. Run charts

Since improvements are made over time, plotting data over time using a run chart is a fundamental method to evaluate the success of improvement efforts in an objective way. The run chart is therefore an important tool with wide potential application in healthcare improvement. The value of a run chart is its simplicity and versatility in letting us learn from our data. We get a picture of the process over time and a method to systematically identify non-random signals (Rocco J Perla, 2011). According to Shewhart WA and Deming WE, viewing data over time rather than in summary statistics yields richer data and more accurate conclusions for improvement projects. This dynamic view gives a clearer picture and understanding of the statistics. Figure 5 illustrates the concept of plotting data over time versus a static view (Lloyd, 2018). An example of a run chart is showed in figure 7 (Alupo, 2017)
Do you understanding variation statistically?

**STATIC VIEW**
- Descriptive Statistics
- Mean, Median & Mode
- Minimum/Maximum/Range
- Standard Deviation
- Bar graphs/Pie charts

**DYNAMIC VIEW**
- Run Chart
- Control Chart
  (plot data over time)
- Statistical Process Control (SPC)

Figure 5: Static vs dynamic view
Balancing measures

These are the possible negative effects of QI interventions as they are being implemented. Are we producing unintended consequences in our efforts to improve? What other factors may be affecting results

What happened to the system as we improved the outcome and process measures? (Yeo, 2012) Balancing measures help keep you from sub-optimizing the system. Examples of balancing measures: Outcome (quality, time), Transaction (volume, no. of patients), Productivity (cycle time, efficiency, utilization, flow, Capacity, demand), Financial (charges, staff hours, materials) Appropriateness (validity, usefulness), Patient satisfaction (surveys, customer complaints) and Staff satisfaction (Lloyd, 2018).

Figure 7: An example of a run chart
2.3 BEHAVIORAL CHANGE MODELS

1. The Trans-theoretical Model
   This involves 6 stages: pre-contemplation, contemplation, preparation, action, maintenance, and termination.
   - **Pre-contemplation:** People are often unaware that their behavior is problematic or produces negative consequences.
   - **Contemplation:** People recognize that their behavior may be problematic, and a more thoughtful and practical consideration of the pros and cons of changing the behavior takes place.
   - **Preparation:** People are ready to take action. People start to take small steps toward the behavior change.
   - **Action:** People have recently changed their behavior and intend to keep moving forward with that behavior change.
   - **Maintenance:** In this stage, people have sustained their behavior change for a while and intend to maintain the behavior change going forward.
   - **Termination:** People have no desire to return to their unhealthy behaviors and are sure they will not relapse (Prochaska, 1997).

2. Fogg behavior model
   For any person to succeed at behavior change, they need to be motivated, have ability to perform the behavior and a trigger to perform this behavior (Fogg, 2009)

3. COM-B behavioral model
   This model utilizes capability, opportunity and motivation to influence behavior change.

ROLE OF SERVICE PROVIDER EDUCATION IN MOTIVATING POSITIVE BEHAVIOR CHANGE

Studies on education of service providers have shown that no interventions consistently produced large improvements, and the ones producing modest improvements tended to be active. Education can clearly communicate the risk of not taking action and the benefits of taking action to address wrong behaviors. Provider education, for example conferences or printed educational materials detailing current recommendations for management of a particular condition is generally ineffective.
Educational outreach visits to providers’ offices, usually targeting more specific aspects of care, such as appropriate medication choices for a target condition can be effective. Provider reminder systems are often effective if well integrated with workflow (Shojania & Grimshaw, 2005).

2.4 QUALITATIVE RESEARCH METHODS

**Focus Group Discussions**

This is a small-group conversation guided by a trained leader. It is used to learn about opinions on a specific topic and to guide future action. Responses are open-ended, relatively broad, and qualitative. The group’s composition and the group discussion should be carefully planned to create a non-threatening environment, so that participants feel free to talk openly and give honest opinions. Since participants also respond to other members and questions posed by the leader, focus groups offer a depth and variety to the discussion. (Box, 2004)

**Key informant interviews**

Key informant interviews are qualitative in-depth interviews with people who know what is going on in the community. The purpose of key informant interviews is to collect information from a wide range of people—including community leaders, professionals, or residents—who have first hand knowledge about the community. These community experts, with their particular knowledge and understanding, can provide insight on the nature of problems and give recommendations for solutions.

The following are two common techniques used to conduct key informant interviews:

- Telephone Interviews
- Face-to-Face Interviews

When to conduct key informant interviews

1. To get information about a pressing issue or problem in the community from a limited number of well-connected and informed community experts.
2. To understand the motivation and beliefs of community residents on a particular issue.
3. To get information from people with diverse backgrounds and opinions and be able to ask in-depth and probing questions.
4. To discuss sensitive topics, get respondents’ candid discussion of the topic, or to get the depth of information you need. Individual or small group discussions (two to three people maximum) create a comfortable environment where individuals can have a frank and open in-depth discussion.

5. To get more candid or in-depth answers. The focus group dynamic may prohibit you from candidly discussing sensitive topics or getting the depth of information you need. Sometimes the group dynamic can prevent some participants from voicing their opinions about sensitive topics (UCLA Center for Health Policy Research, 2004).

2.5 HEPATIC ENCEPHALOPATHY

Hepatic encephalopathy is a brain dysfunction caused by liver insufficiency or Portal systemic shunting which manifests as a wide spectrum of neurological or psychiatric abnormalities ranging from subclinical alterations to coma (Vilstrup et al., 2014). Hepatic encephalopathy is a condition that is relatively common in patients with liver disease (Poordad, 2007) and is associated with significant morbidity and mortality (Poordad, 2007; Stepanova, Mishra, Venkatesan, & Younossi, 2012). Hepatic encephalopathy has a significant effect on a patient's quality of life, work capability, learning ability, driving performance and recently has been associated with increased hospital admissions (Fichet et al., 2009; Patidar & Bajaj, 2015). Studies done in the United States indicate that overt hepatic encephalopathy will occur in 30%–45% of those with chronic liver disease at some time during their clinical course. Minimal HE occurs in 20%–60% of patients with cirrhosis. The prevalence of hepatic encephalopathy among patients admitted to the medical ward at a hospital in Mwanza Tanzania was 0.4%. Most common liver diseases included alcoholic cirrhosis, hepatitis B infection, and hepatocellular carcinoma which were present in 47.7%, 22.7%, and 23.9% of patients, respectively. Majority had West Haven grade 3 (36.4%) and grade 4 (18.2%) (Raphael, 2016). A classification of hepatic encephalopathy was introduced at the World Congress of Gastroenterology 1998 in Vienna.
1. Type A: Type A HE is recognized in the presence of acute liver injury. It often progresses rapidly – often within hours or days – to coma, seizures, decerebrate rigidity and frequently death.

2. Type B: is caused by portal-systemic shunting without associated intrinsic liver disease. In type B hepatic encephalopathy, toxins bypass the liver because of artificial creation, congenital persistence, or spontaneous development of portosystemic shunts, which connects the portal venous system supplying blood to the liver with the general (systemic) venous circulation

3. Type C occurs in people with cirrhosis - this type is subdivided into episodic, persistent and minimal encephalopathy (Bajaj, 2010).

Pathogenesis

1. The ammonia hypothesis
   Blood ammonia concentration was subsequently noted to be elevated in patients with liver disease and hepatic coma, the highest values being found in those patients who were in coma. In the presence of chronic liver dysfunction, urea synthesis is impaired and the brain acts as an alternative major ammonia detoxification pathway (Jalan, 2003).

2. SIRS hypothesis
   In patients with cirrhosis, there is increasing evidence for the role of Systemic Inflammatory Response Syndrome in exacerbating the symptoms of HE. Markers of systemic inflammation are significantly higher in those with minimal HE compared with those without it (Shawcross, 2004).

3. Other theories
   These include serotonin theory, an imbalance between aromatic amino acids and branched-chain amino acids, zinc depletion and manganese neurotoxicity

Diagnosis of HE

Diagnosis of covert HE is by means of psychometric tests (Lauridsen, 2015). Diagnosis of overt HE is based on a clinical examination using the West Haven criteria and the Glasgow Coma Scale. OHE still remains a diagnosis of exclusion. No laboratory test is presently available to diagnose overt HE (Vilstrup et al., 2014). West Haven grades of HE are as follows (Ferenci P, 2002).
### Table 1: Grades of HE

<table>
<thead>
<tr>
<th>GRADE USING WEST HAVEN CRITERIA</th>
<th>CLINICAL FEATURES</th>
<th>GLASGOW COMA SCALE</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No apparent abnormality on clinical examination</td>
<td>15</td>
</tr>
<tr>
<td>1</td>
<td>Short term memory loss, difficulty in concentrating, reversal of sleep-wake cycle</td>
<td>15</td>
</tr>
<tr>
<td>2</td>
<td>Lethargy, apathy, drowsiness, flapping tremor, disorientation, inappropriate behavior,</td>
<td>12-15</td>
</tr>
<tr>
<td>3</td>
<td>Stupor but easily arousable, marked confusion</td>
<td>6-12</td>
</tr>
<tr>
<td>4</td>
<td>Coma, unresponsive</td>
<td>3-6</td>
</tr>
</tbody>
</table>

(Shawcross, 2011)

**Treatment**

Currently, only patients with overt HE are routinely treated (Ferenci P, 2002). Indications for treatment of covert HE include impairment in driving skills, work performance, quality of life, or cognitive complaints. Patients with severe grades of HE are managed in the Intensive care unit. Controlling precipitating factors in the management of overt HE is of paramount importance (Strauss E, 1992).

- Lactulose is generally used as initial treatment for OHE through its laxative and acidifying effects in the gastrointestinal system (Als-Nielsen B, 2004)
- Rifaximin has been used for the therapy of HE in a number of trials (Patidar KR, 2013).
• Other drugs have shown variable effectiveness. These include glutaminase inhibitors (Hawkins RA, 1994), metronidazole, flumazenil, probiotics (Agrawal A, 2012) and L-ornithine L-aspartate (Kircheis G, 1997).

• Liver Transplantation remains the only treatment option for refractory HE (Guideline, Members: Piero Amodio, & Kevin D. Mullen, 2014).
CHAPTER THREE: STUDY METHODOLOGY

3.1 STUDY DESIGN

This study was a cross-sectional study with quality improvement components to improve the process of data documentation and collection.

3.2 STUDY SETTING

The study was conducted on the Gastro-intestinal ward at Mulago hospital, Kiruddu Directorate of Internal Medicine. Mulago hospital is the national referral hospital in Uganda. The hospital has an official capacity of 1,790 beds, although it often houses over 3,000 patients, receiving patients from other regional referral hospitals and health centers as well. The gastroenterology unit has a 30 bed capacity currently with 5 specialists, 2 intern doctors and 4 nurses. Senior house officers and medical students rotate on the unit as well according to their school timetable. Patients are sent to the GI ward after assessment and initial resuscitation in the emergency department. Once the patient is admitted to the ward, they are registered in the admission book with the working diagnosis and date of admission. Each patient is assigned a physician, senior house officer, intern and medical student who are responsible for the patient while on the ward. The patients are clerked by the intern at arrival then later reviewed by the SHO and physician.

The face sheet (Appendix 5) is a yellow form and forms the first page of the patient’s medical file. It contains information regarding the patient’s demographics and clinical information during the hospital stay. Clinical information includes provisional diagnosis, final diagnosis, discharge status, responsible team on the ward and the summary of the patient’s hospital stay. The temperature monitoring form (Appendix 6) is one of the 5 monitoring forms that are used to monitor patient’s vital signs e.g BP, pulse, temperature and other parameters. This also used this form to monitor the grade of hepatic encephalopathy. These forms are illustrated in the appendix 5 and 6.

3.3 POPULATIONS

Target population: All patients with liver disease in Uganda
Accessible population: Patients admitted with liver disease on the GI ward during the study period.

Study population: Patients with liver disease admitted on the GI ward during the study period and meet the inclusion criteria

Eligibility criteria

Inclusion criteria:
All patient medical files with a documented liver disease diagnosis on the final diagnosis field of the face sheet.

Exclusion criteria:
Patients with liver disease diagnosis who were transferred to other wards with the file.

3.4 SAMPLING STRATEGY

• Consecutive sampling of medical files with documented liver disease diagnosis in the final diagnosis field of the face sheet was done until sample size was attained.

3.5 SAMPLE SIZE ESTIMATION FOR THE PRIMARY OBJECTIVE

$$N = \frac{Z^2 \times P \times (1 - P)}{\delta^2}$$

The sample size for the primary objective of estimating the prevalence of hepatic encephalopathy was calculated using the Kish Leslie formula

Where; N = the desired sample size

Z=Standard normal deviate at 95%confidence interval corresponding to 1.96
P= 0.2. (Assumed prevalence of HE among liver disease patients; Study by Apica et al excluded acute liver diseases)

δ= Level of precision of 5%.

N= \[1.96 \times 1.96 \times 0.8 \times 0.2 \times 0.05 \times 0.05\]

This gives a sample size of 246 patient’s files with documented liver disease.

3.6 DATA COLLECTION METHODS

A) Quality improvement components in the process of data collection

- **Secondary Objective 1**: To determine the root causes of inadequate documentation of HE diagnosis on the face sheets and HE grade on the monitoring charts on the GI ward.

The following methods were be used.

1. Process mapping

   Process mapping of the patient’s journey from the arrival to the hospital to discharge was done. This helped in identifying the health workers responsible for documentation on the face sheet and monitoring charts.

2. Root cause analysis

   Two methods of obtaining data on the root causes were used as follows:

   a) **Focus Group Discussions**: The FGDs were carried out amongst the health workers on the ward using a FGD guide (*Appendix 3*). The sessions took about 15-20 minutes in duration. The discussions were recorded by a note taker and were transcribed into themes. During the FGD session, the five whys method of root causes analysis was used. Two focus group discussions were held according to the different cadres: group 1 (3 nurses and 2 intern doctors) and group 2 (5 senior house officers).
b) Key Informant Interviews: The KIIIs were carried out with the Clinical Head of Mulago hospital (Kiruddu), in charge GI ward and Head of Nursing using a KII guide (Appendix 4).

3. Failure Modes and Effects Analysis
Through the FGDs and KIIIs, potential causes of failure of the QI intervention and how these causes could be prevented or mitigated were identified.

- **Secondary Objective 2**: To document the trend in the level of knowledge and attitudes of the health care team regarding documentation of HE diagnosis on the face sheets and HE grade on the monitoring charts before and during an in-service education intervention.

The following steps were taken:

1) QI team formation: This team comprised of the following personnel: Ward nurses, Intern doctors, senior house officers and Physicians.

2) Pre-intervention period: Week 1 to week 9 comprised the pre-intervention period. During this time, we assessed the level of knowledge and attitudes of the health care team regarding the documentation of HE diagnosis and grade using a knowledge assessment tool (Appendix 2) before initiating the in-service QI education intervention. This baseline level of knowledge assessed at week 9 was trended on a run chart.

3) Education of the QI team: At the end of the pre-intervention period, we started educating the team on a weekly basis about the value of appropriate completion of the patients’ medical records, importantly focusing on the face sheet and monitoring charts. We taught them about the proper way of documenting the diagnosis of HE on the face sheet and how to monitor the grades of HE severity on the monitoring charts. The education was done during the gastroenterology division weekly morbidity and mortality report meetings on Thursday and during the ward round.

4) Assessment of the QI team knowledge and attitudes during the intervention: We assessed the level of knowledge and attitudes of the health care team regarding the documentation of HE diagnosis and grade during the implementation of the QI education intervention. A tool was answered on a weekly basis from week 10 to week 30. The tool (Appendix 2) consisted of 8 questions assessing knowledge and 3 questions on attitudes. The attitudes were assessed as enjoyment in completing the face sheets and monitoring charts as well
as reduced time for other ward activities. The average score of the QI team as a whole was calculated and recorded weekly to demonstrate a trend throughout the project. Face validity of the tool was done to get a rapid appraisal of whether the tool was valid for its intended purpose.

5) Balancing measures: Measures that were meant to detect the undesirable effects of our QI intervention were measured quantitatively i.e whether completion of the forms reduced their time for other ward activities or whether it reduced their joy in work.

6) PDSA cycles: Plan, Do, Study and Act cycles were carried out to assess whether the education of the health workers was leading to better documentation on the face sheets and monitoring charts.

**Plan:** Arranged for weekly education sessions of members of the QI team on the ward.

**Do:** Carried out education sessions of the QI team during the gastroenterology division weekly morbidity and mortality report meetings on Thursdays.

**Study:** Collected data on the knowledge and appropriate completion of the health records and shared results weekly.

**Act:** gave the feedback to the QI team, made changes for next cycle, and received feedback from the team.

- **Secondary Objective 3:** To determine the trend in the proportion of the face sheets and monitoring charts which are adequately completed for HE before and during an in-service education intervention.

1. **Pre-intervention period:** From week 1 to week 9 before initiating the education intervention, data regarding completion of the face sheets, documentation of the final diagnosis, documentation of HE diagnosis on the final diagnosis field and grade of HE on the temperature monitoring chart was extracted using a data extraction tool (Appendix 1) after patients’ discharge from the ward. Every day, the records clerks reviewed the charts discharged from the GI ward and completed the data collection tool. The data collectors were trained on how to complete the data extraction tool (Appendix 1) before initiation of the project. The diagnosis of liver disease and HE was extracted from the face sheet and grading extracted from the patient’s monitoring chart and information filled in the tool. The number of fields filled appropriately on the face sheets was also counted and recorded. At the end of the week, the principal investigator reviewed, summarized and
plotted the week’s data on the run charts to demonstrate a trend in documentation over the study period.

2. During the QI intervention period: from week 10 to 30 after initiation of the education intervention, data regarding completion of the face sheets, documentation of the final diagnosis, documentation of HE diagnosis on the final diagnosis field and grade of HE on the temperature monitoring chart was extracted using a data extraction tool (Appendix 1) after patients’ discharge from the ward. At the end of the week, the principal investigator reviewed, summarized and plotted the week’s data on the run charts to demonstrate a trend in documentation over the study period.

Improved estimate of HE

- **Primary Objectives:**
  1. To obtain an improved estimate of the prevalence of HE among patients with liver diseases admitted on the GI ward at Mulago Hospital.
  2. To obtain the frequency of the various grades and types of HE.

The following methods were used:

From the summary of the weekly data, the prevalence was the cumulative total of the face sheets with diagnosis of HE documented on the final diagnosis field of the face sheet after QI components were incorporated in the process of data collection. The prevalence of different types was derived from final diagnosis field on the face sheet. The frequency of the different grades on admission were derived from the first recorded grade on the temperature-monitoring chart.

### 3.7 STUDY MEASUREMENTS

**A) Quality improvement components in the process of data collection**

- **Secondary Objective 1:** To determine the root causes of inadequate documentation of HE diagnosis on the face sheets and monitoring charts on the GI ward.

1. A process map was drawn to identify the processes involved in documenting the diagnosis and grade of hepatic encephalopathy and ensuring appropriate completion of health records.
2. Data from root cause analysis obtained from focus group discussions and key informant interviews was classified into themes in order to highlight the important messages. Informative quotations were recorded. A fish bone diagram was drawn to demonstrate the root causes.

- **Secondary Objective 2:** To document the trend in the level of knowledge and attitudes of the health care team regarding documentation of HE diagnosis on the face sheets and monitoring charts before and during an in-service education intervention. The average score of the QI team on the weekly knowledge assessment tool was calculated. The weekly score was plotted on run charts.

- **Secondary Objective 3:** To determine the trend in the proportion of the face sheets and monitoring charts adequately completed for HE before and during an in-service education intervention.
The following calculations were done:

➢ Proportion of face sheets with documented Final diagnosis per week

\[
\text{Proportion} = \frac{\text{Number of face sheets with a final diagnosis documented}}{\text{All discharged patient's face sheets}}
\]

➢ Adequately completed face sheets per week

\[
\text{Adequately completed} = \frac{\text{Number of face sheets where all the fields were filled}}{\text{All discharged patient's face sheets}}
\]

➢ Proportion of face sheets with documented HE diagnosis per week

\[
\text{Proportion} = \frac{\text{Number of face sheets with documented HE diagnosis}}{\text{Number of face sheets with documented liver disease}}
\]

➢ Adequately completely monitoring chart for HE per week

\[
\text{Adequately completed} = \frac{\text{Cases with documented grade of HE on the monitoring chart}}{\text{Total number of documented HE cases}}
\]

➢ Adequately completed final diagnosis of HE on the face sheet per week

\[
\text{Adequately completed} = \frac{\text{Cases with the type of HE documented on the face sheet}}{\text{Total number of documented HE cases}}
\]

B) Improved estimate of HE

Primary Objectives 1 and 2: To determine the overall prevalence of hepatic encephalopathy among patients with liver disease on the GI ward at Mulago hospital and analyze the frequency of the various grades and types.

The following calculations were done:

➢ Prevalence of hepatic encephalopathy

\[
\text{Prevalence} = \frac{\text{Total number of face sheets with documented HE diagnosis after initiation of the QI intervention}}{\text{Total number of face sheets with documented liver disease after initiation of QI intervention}}
\]

Analysis of various grades and types of hepatic encephalopathy were calculated as follows:

➢ Prevalence of various grades
Prevalence of various types of HE = \[ \frac{\text{Number of face sheets with specific HE grade}}{\text{Total number of documented HE cases}} \]

3.8 DATA MANAGEMENT

All received data collection tools were checked for completeness and consistency. Confidentiality was ensured using IP numbers. Data was backed up on an external hard drive.

3.9 DATA ANALYSIS

Data was entered into Epi data version 4.2 and exported to STATA for analysis. Qualitative data was transcribed into themes and important messages extracted. Numerical data were summarized using means and standard deviations. Weekly data of completion of the face sheets and documentation of the final diagnosis were plotted on run charts.

3.10 QUALITY CONTROL

In order to support the health workers to produce good data, they were continuously reminded about their roles in the project and feedback was given at least weekly and as needed by the principal investigator.

The data collection team was trained on the use of the data extraction tool and the way to collect data. They were also be trained on how to enter the data in the computer by the principal investigator.

The principal Investigator provided support supervision by regularly interacting with the data collectors and health care team.

The quality improvement methods used to improve the process of data collection generated better quality data that provided a prevalence rate of HE nearer to the truth.
3.11 ETHICAL CONSIDERATIONS

Permission to carry out the study was sought and obtained from the Department of Medicine, Makerere University College of Health Sciences and the School of Medicine Research and Ethics Committee (SOMREC).
CHAPTER FOUR: RESULTS

This study was carried out on the GI ward at Mulago hospital, Kiruddu Directorate of Medicine between May 2018 and March 2019.

A) Quality improvement components in the process of estimation of prevalence of HE.

1. Root cause analysis of inadequate documentation of HE diagnosis on the face sheets and HE grade on the monitoring charts on the GI ward.

   a) Process mapping

   The journey the patient traverses from the emergency department to the GI ward is shown in the process map in Figure 8. The health workers critical in the process of completing the face sheets are the records clerk who fill in the socio-demographic information and the intern doctors who fill in the summary clinical section at discharge from the ward. The SHOs and intern doctors are responsible for grading the HE on the monitoring charts. Potential areas for QI include education of the record clerks at the emergency areas, intern doctors and SHOs on the GI ward to improve the documentation of the diagnosis on the face sheet and grading on the monitoring chart. Another crucial step in the process of completion of the face sheets and monitoring charts is the supervision of the interns and SHOs by the physicians to ensure the forms are complete.
CASUALITY WARD:
• Patient arrives at emergency reception.
• Patient is given a casualty Reg number

• Patient transferred to level 6 and registered in the HMIS book

• Patient admitted on the GI ward and registered in the admission book and procedure book

• Intern Dr. fills out the clinical section of the face sheet (final dx, summary, outcome)

• Intern complete the patient’s discharge form and hands it to the attendant

• Records clerk fills the ICD 10 classification codes

• Information from the face sheets entered into the data collection tool and then electronic data base

• Patient moved to the casualty area and assessed by the MO
• MO fills out casualty assessment form with provisional diagnosis

• Patient is reviewed by the intern, SHO and physician on call

• Patient reviewed by intern who then documents the provisional diagnosis on the face sheet

• Patient is discharged from the ward/ passes on.
• Intern looks up the last diagnosis made by the senior doctors

• Intern places the patient’s file with the summarized face sheet in the box for summarized discharges at the nurse’s station

• Diagnosis at discharge and date of discharge is documented in the HMIS

• Check completion of the face sheet and supervise the intern/SHOs as they complete the face sheet and monitoring chart

• Periodic review of the summarized discharges by the physicians and SHOs supervising the interns

• Records clerk picks file and takes them to the records office

Figure 8: Process map
N.B: The shaded boxes indicate areas of improvement introduced by the QI team in the process of data collection.

b) The root causes of inadequately documented diagnosis of HE on the face sheets and HE grade on the monitoring charts were categorized into 4 main groups: health worker related, environmental, System related and equipment related. A fish bone diagram to illustrate these themes is shown in figure 9.

Health worker related causes:

I. Negative attitude by health workers towards completion of the face sheets e.g restricted mind set to filling specific fields and ignoring others, reluctance in completing some of the fields. As one of the health workers said” What is the relevance of filling all the fields?” “For example fathers name?”

II. Ignorance of why and how to complete the face sheets and monitoring charts. A doctor on the ward said “People don’t know the benefits of filling the fields”. “People don’t know how to fill it”. Health workers are also not aware as who is responsible for completing these records. One of them asked, “Who is supposed to do the monitoring on the charts?”

III. Poor coordination amongst the health workers

IV. Recording is not given priority in health care. Health workers are more interested in other ward activities besides completion of records. One of the health workers commented that “The face sheet is a by the way”.

V. Understaffing. There is high patient to health worker ratio. Therefore, little time is dedicated to ensuring well completed face sheets and monitoring charts. Some of the participants said “At times government has said no more recruitment”. “There are few staff on duty”. “More focus on how to help patients, as an intern you can get 10 new patients and clearly you want to first clerk before your senior arrives”.

System and process related factors
I. Insufficient supervision by the seniors and ward managers to ensure that the medical records especially the face sheets are adequately completed. One of the doctors said that “Some of the supervisors are not interested in completing medical records”.

II. No utility of the information collected on the face sheets because in most cases these files disappear after the patients have been discharged and cannot be retrieved when the patient is readmitted. One of the doctors said that “There is no point, you will fill them and they will be taken by the records people, if the patient comes again you will never see it. The patient is given a new file”.

III. Poor orientation of the new staff on the wards. One of the participants said, “My role in the medical records wasn’t specified”.

Environmental factors

I. Language barrier between the health workers and patients. As one participant said “There is nobody to quickly interpret”.

II. Lack of information from the patients who are critically ill patients, lack of previous medication documents, lack of attendants. As one participant said “There is no body to provide data for the unknowns”.

III. Lack of supervision by senior colleagues

IV. Too many patients to take care of with few health workers on the ward. One of the health workers courted that “Only 1 or 2 nurses run the whole ward”.

Equipment related factors

Absence of equipment like BP machine, thermometers to complete the monitoring charts. “We don’t have tools” said one of the nurses.
Figure 9: Fish bone diagram

Recommendations on how to improve the medical records from the FGDs and KIIIs included:

I. Constant supervision by ward in charge, physicians and SHOs. “Supervision is key” a doctor noted.

II. Form adjustment. “Redesigning the forms to make them easier to fill” as one of the nurses advised.
III. Continuous training of health workers in CPDs regarding the value of completion of the medical records. Two of the participants said “**Have CMEs on the wards about documentation**”.

IV. Regular reminders on documentation “**Constant reminders from the seniors**”

V. Appraisal on record completion.

VI. Work together as a team” **Everyone should be involved**”

VII. Employ more staff on the wards

VIII. Reward good performers

c) **The 3 possible causes of failure of the quality improvement intervention identified included the following:**

I. Heavy work load that the health workers may still fail to complete the fields despite the education

II. Health workers with poor attitude may still fail to complete the final diagnosis despite the training.

III. Lack of team work among the health workers on the ward.

We can mitigate these problems by rewarding the health workers that perform well, close supervision and increasing the number of staff on the ward.
2. The trend in the level of knowledge and attitudes of the health care team regarding documentation of HE diagnosis on the face sheets and HE grade on the monitoring charts before and during an in-service education intervention.

a) Knowledge trend

The trend in knowledge of the health workers on the GI ward regarding the documentation of diagnosis of hepatic encephalopathy on the face sheets and monitoring charts had a waxing and waning pattern during the study as shown in figure 10 below. The average knowledge score before the intervention was about 61%. During the subsequent weeks, the average knowledge score decreased with each new set of health workers that rotated on the ward. With the weekly training, the average score improved gradually. We noticed that the average score during the intervention period improved to 76%. The weekly scores didn’t reach pre intervention levels during the period of the intervention.

![Knowledge Assessment Score](image)

**Figure 10: Knowledge assessment score**
b) Attitude trend: Joy in work

The mean score of joy in completion of the face sheets generally increased from 5 before the intervention to 8.8 during the intervention period as illustrated in figure 11.

Figure 11: Trend in attitude, Joy in completion of the face sheets per week.

(Scale=0-5; didn’t enjoy at all, 6-7; enjoyed to some extent, 8-10; definitely Enjoyed)
c) **Attitude trend: Reduced time for other patient care activities**

Reduction in time for other planned ward activities in the process of patient care didn’t vary significantly before and during our intervention as shown in **figure 12**. Average score before the intervention was 5. During the intervention, the average score was 3.9. The significant reduction in time at week 20 was because of the new lot of intern doctors that had just reported for internship for the first time.

![Weekly score of reduction in time for other ward activities](image)

**Figure 12: Reduction in time for other ward activities**

(Scale 0-5: didn’t reduce time for other activities, 6-7: reduced time to some extent, 8-10: significantly reduced time for other activities).
3. The trend in the proportion of the face sheets and monitoring charts that were adequately completed for HE before and during an in-service education intervention.

a) Final diagnosis documentation on the face sheet

The proportion of face sheets with the final diagnosis documented in the final diagnosis field of the face sheet improved from 22% during week 1 to 100% in weeks 15, 24, 25, 26, 29 and 30 as shown in *figure 13*. There was significant improvement in documentation of the final diagnosis. After the intervention, diagnosis was almost 7 times more likely to be documented than before (OR 6.896).

![Proportion of face sheets with final diagnosis documented](image)

*Figure 13*: Trend in documentation of the final diagnosis on the face sheet per
b) Adequately completed face sheet

The percentage of face sheets with documented liver diseases that were adequately completed (all fields completed) during the pre-intervention period from week 1 to week 9 was 0% and this extended until week 15 (5 weeks after education initiation) where we noticed a 10% improvement in the completion. With continuous education, reminders and close supervision we were able to reach 100% adequately completed face sheets in week 24 as shown in figure 14 below.

Figure 14: Trend in the completion of all fields of the face sheet
c) Proportion of completed fields on the face sheet

There are 46 fields to be completed on the face sheet. We observed significant improvement in the weekly trend of completed fields on the face sheet during the course of the project. We started off with an average of 66.1% of the fields completed in week 1. We achieved our highest completion rate in week 24 as shown in figure 15 below. After education was started, the average percentage completion rate increased from 75.9% to 92.2%.

![Weekly trend of completed fields on the face sheet]

**Figure 15:** Weekly trend of completed fields of the face sheet
d) Adequately documented final diagnosis of HE

There was a significant improvement in the documentation of the type of HE during the intervention period as shown in *figure 16*.

Figure 16: Trend in adequately completed final diagnosis of HE on the face sheet
e) Adequately documented monitoring chart for HE diagnosis

The monitoring charts were not adequately completed even during the intervention as shown in figure 17.

Figure 17: Trend in adequately completed monitoring chart for HE
B) Improved estimate of HE Prevalence

1. Patient enrollment

Face sheets of the patients discharged from the ward were consecutively screened for eligibility. A total of 776 face sheets were screened during the entire study period. 205 face sheets were screened during the pre-intervention period. 571 face sheets were screened after the QI intervention begun. During the QI intervention period, a sample size of 265 face sheets with a documented liver disease diagnosis was achieved out of the 571 face sheets screened. 306 face sheets were eliminated because they had other documented diagnoses or the final diagnosis was missing. The 265 face sheets with documented liver disease diagnosis were analyzed for the presence of documented HE diagnosis as shown in the study flow diagram in *figure18 below*. 
776 face sheets of patients discharged from the GI ward during the study period

571 Face sheets of patients discharged from the GI ward during QI intervention period

205 face sheets during the pre-intervention period

306 face sheets Other diagnoses apart from liver disease

265 Face sheets with documented liver disease diagnosis on the final diagnosis field of the face sheet

59 Face sheets with documented HE diagnosis on the final diagnosis field of the face sheet

Data extraction and HE prevalence estimation
Assess frequency of various types and grades

Figure 18: Study flow diagram
2. **Social demographic characteristics of the study population**

The mean age of the patients with documented liver disease diagnosis was 43 years. Male sex constituted 69.4% of the patients with documented liver disease. Catholic religion had the highest prevalence of documented liver disease diagnosis at 43.4%. Most of the patients were from the central region as their tribal origin at 49.4%. *Table 2* illustrates the socio-demographic characteristics of our study population.
Table 2: Social demographic characteristics of the study population

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Categories</th>
<th>Frequency N=265</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (mean, SD)</td>
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</tr>
<tr>
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<td>30</td>
<td>11.3</td>
</tr>
<tr>
<td>Non Ugandan</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Discharge status</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cured</td>
<td></td>
<td>5</td>
<td>1.9</td>
</tr>
<tr>
<td>Improved</td>
<td></td>
<td>182</td>
<td>68.7</td>
</tr>
<tr>
<td>Unimproved</td>
<td></td>
<td>29</td>
<td>10.9</td>
</tr>
<tr>
<td>Died</td>
<td></td>
<td>40</td>
<td>15.1</td>
</tr>
<tr>
<td>Not documented</td>
<td></td>
<td>9</td>
<td>3.4</td>
</tr>
</tbody>
</table>
3. **Proportion of the documented liver diseases**

Majority of the documented liver disease diagnosis was due to liver cirrhosis as shown in *Table 3*.

**Table 3: Frequency of the various documented liver diseases**

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cirrhosis of the liver</td>
<td>181</td>
<td>68.3</td>
</tr>
<tr>
<td>Other diseases of the liver</td>
<td>41</td>
<td>15.5</td>
</tr>
<tr>
<td>Acute hepatitis</td>
<td>14</td>
<td>5.3</td>
</tr>
<tr>
<td>Toxic liver disease e.g. drug induced drug</td>
<td>10</td>
<td>3.8</td>
</tr>
<tr>
<td>Liver peri-portal fibrosis</td>
<td>8</td>
<td>3.0</td>
</tr>
<tr>
<td>Other inflammatory diseases</td>
<td>4</td>
<td>1.5</td>
</tr>
<tr>
<td>Alcoholic liver disease</td>
<td>3</td>
<td>1.1</td>
</tr>
<tr>
<td>Acute liver failure</td>
<td>2</td>
<td>0.8</td>
</tr>
<tr>
<td>Chronic hepatitis</td>
<td>2</td>
<td>0.8</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>265</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>
4. Prevalence of HE among liver disease patients

Of the 265 face sheets with documented liver disease diagnosis, 59 face sheets had a documented diagnosis of hepatic encephalopathy which is a prevalence of 22.3%. The highest weekly prevalence was 53.3% at week 9 in the pre-intervention period. On average, about 54% of the face sheets had the final diagnosis documented during the pre-intervention period as shown in figure 13. Many patients with liver disease might have been missed because they were not documented on the face sheets hence reducing the denominator and therefore increasing the prevalence rate. When the documentation of the final diagnosis improved, the weekly prevalence became lower. The weekly trend in prevalence of HE during the pre-intervention and during the QI intervention is illustrated in figure 19.

![Weekly HE prevalence graph](image)

**Figure 19:** Trend in weekly prevalence of hepatic encephalopathy among liver disease patients
5. Characteristics of HE patients

Mean age of patients with HE was 46 years and most were male. Most were either of catholic or Anglican religion as illustrated in Table 4 below. Liver disease patients with HE were more likely to die than those without HE (p=0.003).
<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Categories</th>
<th>HE</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes =59</td>
<td>No= 206</td>
<td></td>
</tr>
<tr>
<td></td>
<td>N (%)</td>
<td>N (%)</td>
<td></td>
</tr>
<tr>
<td>Age (mean, SD)</td>
<td>46.2, 15.5</td>
<td>42.5, 16.2</td>
<td></td>
</tr>
<tr>
<td>Sex</td>
<td>Male</td>
<td>40 (21.7)</td>
<td>144 (78.3)</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>19 (23.5)</td>
<td>62 (76.5)</td>
</tr>
<tr>
<td>Religion</td>
<td>Muslim</td>
<td>2 (6.3)</td>
<td>30 (93.7)</td>
</tr>
<tr>
<td></td>
<td>Catholic</td>
<td>24 (20.9)</td>
<td>91 (79.1)</td>
</tr>
<tr>
<td></td>
<td>Anglican</td>
<td>25 (28.7)</td>
<td>62 (71.3)</td>
</tr>
<tr>
<td></td>
<td>Pentecostal</td>
<td>1 (14.3)</td>
<td>6 (85.7)</td>
</tr>
<tr>
<td></td>
<td>Others</td>
<td>6 (26.1)</td>
<td>17 (73.9)</td>
</tr>
<tr>
<td></td>
<td>Not recorded</td>
<td>1 (100.0)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td>Occupation</td>
<td>Peasant</td>
<td>18 (19.8)</td>
<td>73 (80.2)</td>
</tr>
<tr>
<td></td>
<td>Business</td>
<td>11 (22.0)</td>
<td>39 (78.0)</td>
</tr>
<tr>
<td></td>
<td>Civil servant</td>
<td>5 (38.5)</td>
<td>8 (61.5)</td>
</tr>
<tr>
<td></td>
<td>Others</td>
<td>24 (21.8)</td>
<td>86 (78.2)</td>
</tr>
<tr>
<td></td>
<td>Not recorded</td>
<td>1 (100.0)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td>Region</td>
<td>Eastern</td>
<td>8 (27.6)</td>
<td>21 (72.4)</td>
</tr>
<tr>
<td></td>
<td>Western</td>
<td>9 (19.1)</td>
<td>38 (80.9)</td>
</tr>
<tr>
<td></td>
<td>Northern</td>
<td>7 (25.0)</td>
<td>21 (75.0)</td>
</tr>
<tr>
<td></td>
<td>Central</td>
<td>34 (26.0)</td>
<td>97 (74.0)</td>
</tr>
<tr>
<td></td>
<td>Non Ugandan</td>
<td>1 (3.3)</td>
<td>29 (96.7)</td>
</tr>
<tr>
<td>Discharge outcome</td>
<td>Cured</td>
<td>2 (40.0)</td>
<td>3 (60.0)</td>
</tr>
<tr>
<td></td>
<td>Improved</td>
<td>30 (16.5)</td>
<td>152 (83.5)</td>
</tr>
<tr>
<td></td>
<td>Unimproved</td>
<td>9 (31.0)</td>
<td>20 (69.0)</td>
</tr>
<tr>
<td></td>
<td>Died</td>
<td>17 (42.5)</td>
<td>23 (57.5)</td>
</tr>
<tr>
<td></td>
<td>Not recorded</td>
<td>1 (11.1)</td>
<td>8 (88.9)</td>
</tr>
</tbody>
</table>
6. Prevalence of the different grades of HE

The most prevalent documented type of HE was type C at 40.7% during the intervention period. Of the 181 patients with documented liver cirrhosis, 24 had a documented type C therefore the prevalence of HE among liver cirrhotic patients was 13.3%.

Table 5: Prevalence of the different types of HE

<table>
<thead>
<tr>
<th>HE type</th>
<th>Frequency N=59</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type A</td>
<td>3</td>
<td>5.1</td>
</tr>
<tr>
<td>Type B</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Type C</td>
<td>24</td>
<td>40.7</td>
</tr>
<tr>
<td>Not documented</td>
<td>32</td>
<td>54.2</td>
</tr>
<tr>
<td>Total</td>
<td>59</td>
<td>100</td>
</tr>
</tbody>
</table>

7. Grades of hepatic encephalopathy

Of the 59 patients with documented HE diagnosis on the face sheet, only 6 had the grading of HE documented on the monitoring chart. Majority of the patients with documented grade of hepatic encephalopathy had grade 2 and grade 4 as shown in Table 4-5. The majority of the monitoring charts for patients with a documented HE diagnosis had no grading of HE done. Some of the monitoring charts were actually missing in the files.

Table 6: Various grades of HE

<table>
<thead>
<tr>
<th>Initial HE grade</th>
<th>Frequency N=9</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade1</td>
<td>1</td>
<td>16.7</td>
</tr>
<tr>
<td>Grade 2</td>
<td>2</td>
<td>33.3</td>
</tr>
<tr>
<td>Grade3</td>
<td>1</td>
<td>16.7</td>
</tr>
<tr>
<td>Grade 4</td>
<td>2</td>
<td>33.3</td>
</tr>
<tr>
<td>Total</td>
<td>6</td>
<td>100</td>
</tr>
</tbody>
</table>
CHAPTER FIVE: DISCUSSION

A) Quality improvement in the process of data collection

Root cause analysis

Process mapping helped to analyze the journey of the patient from the emergency ward till discharge and guided the determination of areas for improvement. When these areas were improved, it is likely that this contributed to improved completion of medical records. For example, the discharged patient’s files with the summarized face sheets were placed separately from those that were not summarized. They were kept in a separate box at the nurses’ station. When the health workers involved in documentation were educated, it led to improved completion rates of the face sheets.

During the root cause analysis, we found that poor documentation is multifactorial in etiology encompassing health worker, system and environmental factors. The lack of knowledge and poor attitude of the health workers regarding completion of the face sheets and monitoring charts supported our intervention of education of the health care team in the hope of improving the medical records. Our findings were similar to those found elsewhere in Africa for example in Ethiopia where knowledge gap was accepted as root cause for existence of incomplete inpatient medical records (Tola et al., 2017).

Our findings were similar to those elsewhere in the world for example a study done in India found that 77.8% of the participants had low knowledge about medical records documentation and 54.1% of them did not have good attitude about completion of medical records the significance and value of medical records documentation in treatment, education and research (Hasan Siamian, 2008).

Study in Iran, most nurses (85.9%) had limited knowledge regarding nursing documentation process (Jasemi, Zamanzadeh, Rahmani, Mohajjel, & Alsadathoseini, 2012).

System factors for example lack of supervision of the intern doctors as they write the discharge summaries of the patients was another important issue. During the study, close supervision of the intern doctors resulted in improvement in the completion rates. The poor staffing of health
workers on the ward and overwhelming patient numbers are still challenging issues that require more administrative input to recruit more health workers on the ward.

**Trend in knowledge of the health care team**

The GI ward has a change of team every 6-8 weeks because the intern doctors and SHOs change rotations. Therefore, we observed a waxing and waning pattern in the knowledge of the team because the new group didn’t have much knowledge at the beginning of their rotation. With the subsequent education sessions, their knowledge would improve till the next group starts the next rotation. There is therefore a need to have continuous reminders to the health care team on the ward. New staff on the ward needs to be oriented at the beginning of the rotation.

**Trend in attitudes of the health care team**

The joy in completion of the face sheets and monitoring charts improved during the intervention period because health workers started to understand and appreciate the value of adequately completed records. The practice of adequate documentation on the face sheet was no longer viewed as a burden.

Overall there was no significant reduction in time for other patient care activities therefore health workers on the ward should ensure they complete the face sheets adequately.

**Trends in adequate completion**

Our education intervention that started in week 10 of the study resulted in a significant improvement in the proportion of face sheets with the final diagnosis documented. Documentation of the final diagnosis improved to reach even 100% in some weeks which means that the health workers ensured that most of the patient files had a final diagnosis in the final diagnosis field at discharge during the intervention period which wasn’t the case before.

The trend of appropriately completed face sheets where all the fields were complete was maintained at 0% till about the 15th week. Between weeks 1-9, this was the pre-contemplation where the health workers didn’t know the importance of complete medical records. Between weeks 10-23, there was some little improvement. This might be because the team was in the
contemplation and preparation phases of the trans-theoretical behavioral model. The team recognized that their behavior was wrong and were ready to take action. With close supervision, there was improvement in the proportion of face sheets with all the fields completed to even 100% in week 24. Senior colleagues on the ward continuously supervised the junior colleagues to ensure the face sheets and monitoring charts are well completed.

The trend of completed fields on the face sheets improved gradually to reach 100%. This showed the continuous effort by the team to improve every week.

Documentation of the type of HE also improved during the intervention period. The health workers were more vigilant to document the type of HE in the final diagnosis field during the intervention period.

The improvements observed in our study were similar to results obtained during a study done in 2017 by Alupo et al on in-patient medication adherence rates following attendant education. Using QI methods, the adherence rates improved following attendant education from 46.5% to peak of 98% (Alupo, 2017). This further emphasizes the role of education in behavioral change.

Our findings were similar to a study done in Ethiopia where the overall inpatient medical record completeness was found to be 84% after intervention. An enhancement of completeness and reporting of inpatient medical record completeness increased significantly from the baseline 73% to 84% during post intervention evaluation (Tola et al., 2017).

We did not observe much improvement in the monitoring of HE on the monitoring charts as only 6 of the 59 patients had the grade of their hepatic encephalopathy graded. This could be because patient monitoring and documentation is still a major challenge in Mulago hospital because of lack of monitoring equipment, monitoring stationary and poor health worker attitude. More emphasis needs to be put on grading the severity of HE and documenting it on the monitoring charts. The most prevalent grades were grades 2 and 4 but this is unlikely to be a true estimate.

B) Improved estimation of prevalence of HE

We studied a population of 265 patient files with a documented diagnosis of liver disease. Liver disease was either acute or chronic. Most of our patients were males. This may be because studies have shown that Ugandan men are likely to be long time, frequent, heavy and binge
drinkers than women hence more at risk of alcohol related liver diseases. There is also more liberal alcohol consumption among Catholics and Anglicans. A survey (Uganda Population based HIV Impact Assessment survey, 2016) showed that hepatitis B infection is more prevalent amongst men than women in Uganda hence more at risk of hepatic complications for example liver cirrhosis and hepatocellular carcinoma.

The improved estimate of HE prevalence among patients with liver diseases was 22.3%. The estimate was improved because the study incorporated QI methods in the process of data collection. The prevalence of HE among all patients with documented liver cirrhosis was 13.3%. A study done in 2011 in Mulago hospital showed a prevalence of HE among patients with liver cirrhosis to be 23.5%. This prevalence excluded readmissions. A study of re-admissions during our study period showed the proportions of readmissions to be 21.6%. If this proportion is used to calculate the prevalence of HE among new cases of liver cirrhosis, it gives a prevalence 14.5%. This prevalence is lower than the one obtained by Apica et al in 2011. One possible explanation could be that the study did not incorporate QI methods in the process of data collection.

A study done in Tanzania (Raphael, 2016) showed that most cases of HE occurred in patients with alcoholic cirrhosis and majority had grade 3. Similarly, most of our patients had underlying liver cirrhosis. However, grade 2 was the most prevalent documented grade of HE in our study. This might not be entirely true since we didn’t observe a significant improvement in the documentation of the grade of HE on our monitoring charts.

Prevalence rates in the western world range from 30-45%. This is higher compared to our setting and could be due to better diagnostic capacity to detect HE in these countries and ability to perform porto-systemic shunts for example Trans intra hepatic porto-systemic shunts that contribute to a significant number of cases (type B).

**Study Limitations**

- Diagnosis of liver disease was not confirmed as we did not carry out any biopsies.
- Diagnosis of HE was not confirmed by any objective test.
- Even with QI methods, some fields were still not completed. Some data was still left out in the estimate.
Sustainability of quality improvement in completion of medical records

Involvement of all the health workers on the GI ward empowered all the cadres to own the project and ensure continuity of the culture of quality improvement.

The QI team was encouraged to continue the culture of appropriate completion of medical records. Review of QI in medical records was incorporated in the gastroenterology division weekly morbidity and mortality report and the team was encouraged to maintain this culture.

CONCLUSION

1. The root causes of incomplete documentation of HE diagnosis and other fields on the face sheets are multifactorial and include system related, environmental, health worker related and equipment related. The main cause appears to be lack of supervision of intern doctors and SHOs by the physicians on the ward.

2. When the QI team is educated; knowledge improves to some significant extent but needs to be regularly reinforced to be maintained. This is crucial given the dynamic team on the ward especially for the intern doctors and also because knowledge at times decays. Completion of the face sheets didn’t reduce the time for other patient care activities. The joy in contributing to the completion of the medical records improved as the intervention progressed on possibly because the team understood the value of complete medical records.

3. With education of the QIT, the completion of face sheets for HE diagnosis and other fields improves but required regular close supervision and reminders to be maintained.

4. The prevalence of HE among liver disease patients is 22.3%. The most common type of HE was type C. The most common grade was grade 2. The estimates in the types and grades require improvement because the QIT didn’t adequately complete these parameters.

RECOMMENDATIONS

1. Close supervision of the health care team on the GI ward by the physicians is recommended to ensure good completion of the face sheet and monitoring charts.
2. Continuous education and regular reminders are crucial in improving the knowledge and attitudes of the health workers on adequate completion of the face sheet and monitoring charts especially for HE diagnosis and grading.

3. Continuous education and reminders of the health care team on the value of adequate completion of the face sheets and monitoring charts is advised.

4. Close supervision of the intern doctors, medical officers and SHOs by physicians on the GI ward is advised to maintain these completion rates at higher levels.

5. Nurses on the GI ward are advised to continue reminding the doctors to fill in their respective sections on the face sheets and monitoring charts.

6. Physicians on the ward should supervise the junior doctors; help them make diagnoses with associated complications, which should later be documented on the face sheets.

7. The GI ward requires dedicated medical records assistants to compile data on prevalence and do weekly run charts. The ward needs this data for planning purposes.

8. The various ward units should have regular meetings at least weekly to utilize the weekly data for better planning.

9. The hospital should have monthly meetings as well for data utilization. The hospital administration should support the meetings by mobilizing resources to fund these meetings.

10. Computers should be introduced to assist the record assistants to fill in the data from the face sheets and help compile the run charts. They can also help remind health workers to complete the medical records.

11. QI methods should be incorporated routinely in medical records on the GI ward and other wards so that the estimate of prevalence of various disease conditions is more accurate. From our prevalence estimate of approximately 60 patients of HE every 3 months, we recommend the pharmacy should stock medicines for HE for example rifaximin for at least 5 patients of HE every week. This estimate can be revised depending on the number of patients with HE in the previous weeks if QI methods are maintained in completion of the face sheets.
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APPENDIX

APPENDIX 1: DATA EXTRACTION TOOL

IMPROVING ESTIMATION OF PREVALENCE OF HEPATIC ENCEPHALOPATHY AMONG LIVER DISEASE PATIENTS ON THE GASTROINTESTINAL WARD AT MULAGO HOSPITAL

Date: _______ Week: _____ Serial number: ____________ IP number: ____________

A. Completion of medical records.

1. All 47 fields on face sheet completed? 1) Yes____ 2) No____
2. If no in number 1, number of fields not completed? _____
3. Final diagnosis in the final diagnosis field documented 1) Yes 2) No
4. Final diagnosis of liver disease documented 1) Yes 2) No

________________________________________________________________________

B. Demographics:

5. Age of patient in years: __________
6. Sex of patient: 1) Male____ 2) Female____
7. Religion: 1) Muslim____ 2) Catholic__ 3) Anglican___4) Pentecostal__ 5) others__
8. Occupation of patient: 1) Peasant____ 2) Business_____3) Civil servant____4) others____
9. Tribe: __________
10. Tribal origin: 1) Eastern___2) Western___3) Northern____4) Central____5) Southern__6) Non Ugandan_______ Specify______________

Diagnosis of liver disease

11. Diagnosis of liver disease on the final diagnosis field on the face sheet 1) Yes__2) No____
12. Diagnosis of liver disease made as final diagnosis:
Alcoholic liver disease ______
Toxic liver disease for example drug induced liver injury______
Acute liver failure_____
Acute hepatitis_____
Chronic hepatitis_____
Liver peri-portal fibrosis
Cirrhosis of the liver_____

Other inflammatory liver diseases for example liver abscess, autoimmune hepatitis, phlebitis of the portal vein______Specify:_____

Other diseases of the liver for example: fatty change of the liver, infarction of the liver, portal hypertension, hepatic veno-occlusive disease______Specify: _______

Hepatic encephalopathy

11. Diagnosis of HE documented on the face sheet 1)Yes____ 2) No_____

13. Type of HE documented
   1) Type A______  2) Type B_______  3) Type C_______4) Not documented

14. Grade of HE documented on the monitoring chart
   1) Yes ___ 2. No___

15. Initial Grade of HE recorded on Temperature Chart
    1) Grade 0__ 2) Grade 1______ 3) Grade 2____ 4) Grade 3__5) Grade 4_____

E. Discharge status

16. Discharge status 1) Cured__ 2) Improved_____ 3) Unimproved_____ 4) Died_____5) Not documented

Name of data collector: ………………………………Sign: ……………
APPENDIX 2: QI TEAM KNOWLEDGE AND ATTITUDE ASSESSMENT TOOL

IMPROVING ESTIMATION OF PREVALENCE OF HEPATIC ENCEPHALOPATHY AMONG LIVER DISEASE PATIENTS ON THE GASTROINTESTINAL WARD AT MULAGO HOSPITAL

Date:____________ Sex:___________ Week: __________

Do you agree to participate in the completion of this questionnaire?  Yes    No

For the following 11 questions, circle the best option.

Q1. In a patient with liver cirrhosis and Hepatic encephalopathy, the following is the correct documentation in the diagnosis field of the face sheet.
   A. liver cirrhosis with Hepatic encephalopathy type C
   B. Liver cirrhosis
   C. Hepatic encephalopathy
   D. liver cirrhosis with hepatic encephalopathy type B
   E. liver cirrhosis with hepatic encephalopathy type A

Q2. In a patient with acute liver failure and hepatic encephalopathy, the following is the correct documentation in the diagnosis field of the face sheet.
   A. acute liver failure
   B. acute liver failure with hepatic encephalopathy type C
   C. acute liver failure with hepatic encephalopathy type A
   D. hepatic encephalopathy type B
   E. hepatic encephalopathy type A

Q3. In a patient with liver cirrhosis and hepatic encephalopathy in coma, the following is the correct documentation in the monitoring temperature chart.
   A. hepatic encephalopathy
   B. Hepatic encephalopathy grade 4
   C. Hepatic encephalopathy grade 3
   D. Hepatic encephalopathy in coma
   E. Hepatic encephalopathy grade 1

Q4. In completion of medical records, the most critical steps to improve are the following except;
A. Supervision of the interns
B. Education of the interns
C. Reminding the interns by the nurse
D. Supervision of SHOs
E. Supplying more pens to interns.

Q5. The root causes of inadequate completion of the face sheets for patients with liver disease and hepatic encephalopathy include the following except;

A. Lack of time
B. Face sheets are viewed as a burden
C. Laziness
D. Lack of supervision
E. Face sheets are not available

Q6. The root causes of inadequate completion of temperature monitoring charts for patients with liver disease and hepatic encephalopathy include the following except;

A. Lack of knowledge on how to document hepatic encephalopathy
B. Lack of supervision
C. Monitoring charts are not available
D. Lack of understanding of the importance of completing the monitoring charts.
E. Lack of clip boards.

Q7. When doctors diagnose and document liver disease with hepatic encephalopathy, the patient should have the following signs and symptoms except;

A. signs of liver disease
B. altered mental state
C. flapping tremors
D. all the above
E. stiff neck

Q8. The following is the correct attitudes towards completion of the face sheets in patients with liver disease and hepatic encephalopathy

A. If it is incomplete the responsible team should be reminded to complete it before discharge.
B. it wastes staff’s time.
C. It impedes joy in work.
D. It is never read any way by anyone.
E. It has too many fields to be filled.

SECTION B. put X in the box besides your most appropriate response.

Q9. In the last week, have you contributed to the completion of face sheets for patients with hepatic encephalopathy and other conditions?  1. Yes __  2. No __

If yes, go to Q10 and 11

Q10. On a scale of 0 to 10, how much have you enjoyed contributing to the completion of face sheets of patients with liver disease and hepatic encephalopathy? (Contribution to completion of the face sheets means any of the following: filling, reminding, supervision, making a diagnosis to be documented) 0= not enjoyed at all, 10= enjoyed too much

<table>
<thead>
<tr>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
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<td>☐</td>
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<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

Q11. On a scale of 0 to 10, how much has your contribution to completion of face sheets for patients with hepatic encephalopathy and other conditions reduced your time for other planned activities in the process of patient care in the past week? 0= did not greatly reduce the time, 10= greatly reduced time

<table>
<thead>
<tr>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
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</tr>
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APPENDIX 3: FOCUS GROUP DISCUSSION GUIDE

IMPROVING ESTIMATION OF PREVALENCE OF HEPATIC ENCEPHALOPATHY AMONG LIVER DISEASE PATIENTS ON THE GASTROINTESTINAL WARD AT MULAGO HOSPITAL

1. Why do you think medical records especially the face sheets and temperature charts are not adequately completed on the GI ward at Mulago hospital? (Each reason will be interrogated with another why until key root causes are identified)

2. What do you think should be done to ensure health care workers appropriately complete health records especially the face sheets and monitoring charts?

3. Why do you think health workers inadequately document HE diagnosis among liver disease patients on the GI ward on their face sheets and monitoring charts?

4. How can health care workers improve the documentation of HE diagnosis among patients with liver disease in the GI ward on their face sheets and monitoring charts?

5. What do you think are potential causes of failure of the QI intervention of in service education of the health care team to improve medical records and how these causes can be prevented or mitigated?
APPENDIX 4: KEY INFORMANT INTERVIEW GUIDE

IMPROVING ESTIMATION OF PREVALENCE OF HEPATIC ENCEPHALOPATHY AMONG LIVER DISEASE PATIENTS ON THE GASTROINTESTINAL WARD AT MULAGO HOSPITAL

1) Why do you think medical records especially the face sheets and temperature charts are not adequately completed on the GI ward at Mulago hospital? (Each reason will be interrogated with another why until key root causes are identified)

2) What do you think should be done to ensure health care workers appropriately complete health records especially the face sheets and monitoring charts?

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4) How can health care workers improve the documentation of HE diagnosis among patients with liver disease in the GI ward on their face sheets and monitoring charts?

5) What do you think are potential causes of failure of the QI intervention of in service education of the health care team to improve medical records and how these causes can be prevented or mitigated?
APPENDIX 5: MULAGO HOSPITAL FACE SHEET

MULAGO HOSPITAL

FACESHEET

<table>
<thead>
<tr>
<th>NAME: (Block letters)</th>
<th>OTHER NAMES</th>
<th>Department</th>
<th>Ward</th>
<th>Registration Number</th>
</tr>
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</table>

<table>
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<tr>
<th>Date</th>
<th>Age</th>
<th>Sex</th>
<th>Father's Name</th>
<th>Next of kin relationship</th>
<th>Religion</th>
<th>Occupation</th>
<th>Police notified</th>
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| W.C1 |     |     |               |                          |          |            |                 |

| L.C11 |     |     |               |                          |          |            |                 |

| L.C111 |     |     |               |                          |          |            |                 |

<table>
<thead>
<tr>
<th>Referring Medical Officer</th>
<th>Nearest dispensary</th>
<th>Particulars entered by</th>
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<th>Time</th>
<th>Time charged</th>
<th>Date</th>
<th>Time</th>
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<table>
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<th>Final diagnosis &amp; no. operations</th>
<th>Classification</th>
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<table>
<thead>
<tr>
<th>Final diagnosis &amp; no. operations</th>
<th>Classification</th>
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<tr>
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<th>Improved</th>
<th>Unimproved</th>
<th>Died</th>
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<th>Signature: .....................................</th>
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APPENDIX 6: MULAGO HOSPITAL TEMPERATURE MONITORING CHART

<table>
<thead>
<tr>
<th>DATE</th>
<th>TEMPERATURE</th>
<th>BLOOD PRESSURE</th>
<th>PULSE</th>
<th>RESPIRATION</th>
<th>B.O</th>
<th>URINE</th>
<th>INTAKE</th>
<th>OUTPUT</th>
<th>WEIGHT</th>
</tr>
</thead>
<tbody>
<tr>
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<td>160</td>
<td>90</td>
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<td></td>
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</tbody>
</table>

Celsius to Fahrenheit Equivalents:
- 35°C = 95.0°F
- 36°C = 96.8°F
- 37°C = 98.6°F
- 38°C = 100.4°F
- 39°C = 102.2°F
- 40°C = 104.0°F
- 41°C = 105.8°F
- 42°C = 107.6°F